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ABSTRACT

This report is one of eight volumes in the National Institute of Education's Compensatory Education Study which describe the findings and procedures of the Instructional Dimensions Study, an indepth assessment of the relationships between selected instructional constructs and students' achievement. Program cost analysis was included in the study in order to allow the examination of the cost effectiveness of the program. Program cost analysis results relate to the educational effectiveness analysis results in at least two ways: the cost analysis results can be directly contrasted with reading and math program achievement, attitude, and/or attendance outcomes in order to explore possible relationships between total program cost; and the educational effectiveness analysis which examines the relationship of specific program characteristics to outcomes can be used as a guide for examination of specific program configurations which show greater or lesser educational promise. The cost analysis technique used in the study focuses upon the determination of the cost of all resources devoted to a specific academic program for each of the classroom or sub-classroom analysis units included in the study. (Author/AM)

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KIRSCHNER ASSOCIATES, INC.

PROGRAM COST ANALYSIS

A Supporting Report

of the

INSTRUCTIONAL DIMENSIONS STUDY

1976-1977

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Contract No. NIE 400-76-0060

National Institute of Education
Educational Equity Group
Compensatory Education Division

U.S. Department of Health, Education, and Welfare

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Washington, D.C.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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The Instructional Dimensions Study reports are the products of intensive efforts undertaken during a 19-month period, beginning in March, 1976. While many persons have contributed greatly to the success of the Study, we want to extend special recognition to the following persons:

- Classroom and compensatory education teachers, who generously gave their time to provide detailed information on their teaching practices
- Principals and staff, who allowed full access to the schools, generously supported Study activities, and provided information on instructional programs
- School district administrators, who willingly agreed to participate in the Study, provided full support to staff members, and opened their records to the Study
- Students, who continued with their studies during videotaping and completed the achievement tests and attitude scales
- Local Site Coordinators, who conducted the field work in an exemplary manner and who ably represented the Study in each school district
- Project Officers at the National Institute of Education, who provided understanding as well as supervision and who patiently waited for the findings.

To each of you, the staff for the Instructional Dimensions Study says, "Thank you."

FOREWORD

This report is one of eight volumes which describe the findings and procedures of the Instructional Dimensions Study. The Study was funded by the National Institute of Education (NIE) as part of the Compensatory Education Study, a comprehensive research program conducted in response to a mandate by the U.S. Congress in the Education Amendments of 1974. The findings of the comprehensive study are to be reported to Congress prior to its deliberations in 1977-1978 regarding the extension of the Elementary and Secondary Education Act.

NIE conceived four main themes for addressing the issues of concern to Congress. The themes are Student Development, Services to Children, Funds Allocation, and Administration of Compensatory Education Programs. The Student Development section includes syntheses of previous evaluations of reading and mathematics programs, studies of alternative designs for delivery of compensatory education, and the present study of instruction, the Instructional Dimensions Study. This Study is designed both to gather data on program effectiveness in reading and mathematics and to complement the NIE National Survey of Compensatory Education, which describes the ways Title I funds are used nationally.

The Instructional Dimensions Study is an in-depth assessment of the relationships between selected instructional constructs and students' achievement. These constructs, as measured by the present study, are briefly defined below.

INDIVIDUALIZATION: Individualized instruction is defined as the use of the following instructional strategies:

- Matching students to curriculum levels by use of pretests
- Matching students to curriculum levels by use of mastery tests
- Testing practices
- Assignments and grouping practices
- Use of alternative learning routes for students with learning difficulties
- Sequencing and pacing of students through instructional materials.

OPPORTUNITY: Opportunity to learn has two aspects, quantitative and qualitative. The quantitative aspect is basically the amount of time available for learning. The qualitative aspect is the overlap between what is taught and what is assessed on the tests used to measure student learning.

MOTIVATORS: Motivational factors reflect both interpersonal classroom behaviors and curricular features that are hypothesized to encourage and support learning.

INSTRUCTIONAL EVENTS: This construct includes the quantity of interactions devoted to management and to cognitive teaching of individuals, small groups and the whole class; and the nature of teacher interactive behaviors with students.

TEACHER BACKGROUND: Teacher characteristics measured by this construct include the number of years teaching at the same school, highest degree earned, and the number of hours of training (identified according to training activities and content categories) completed during the past three years.

These five constructs are the elements of the Instructional Dimensions Model. They were essentially drawn from the work and experience of William Cooley and Gaea Leinhardt at the Learning Research and Development Center at the University of Pittsburgh, Pennsylvania. The data for all elements of the Study were collected through interviews, videotape recordings, and analysis and transcription of written materials. In addition, the Study collected information on instructional settings for compensatory education, costs, services provided by school districts, and the criteria used by districts to determine eligibility and participation for school buildings and students in compensatory education programs.

Classrooms participating in the Study were selected according to three primary dimensions: reported degree of individualization, setting, and neighborhood economic status. The Study reflects a focused interest in the effectiveness of the Study Model definition of individualized instructional practices as found within the sample of classrooms, but not in registering the results of these practices at the national level.

The analysis samples were obtained from 90 school buildings in 14 school districts, with approximately 200 classroom teachers, 150 compensatory education teachers, and 4,500 students. Pretests of student achievement and attitudes were conducted in September and early October, 1976, and posttests were administered in April and early May, 1977. Data analyses were conducted over instructional units (based on the teacher or unique pair of teachers providing instruction to a subset of students within a classroom) for first grade reading, first grade math, third grade reading, and third grade math.

The reports are organized into two series. The Final Reports of the Instructional Dimensions Study are *Executive Summary*, and *Study Findings*. Six Supporting Reports provide detailed explanations of the procedures followed by the Study team: *Curriculum Analysis Procedures, Data Collection Management, Program Cost Analysis, School Relations, Video Data Documentation,* and *Study Instruments and File Documentation.*

The analysis of the results, reported in *Study Findings* and *Executive Summary,* was conducted during July, 1977. The 17 months available for the overall conduct of the Study allowed sufficient time for project planning, data collection, and the development of the data base. The time available for project analyses did not allow for analytical work beyond the direct investigation of the simple impacts of Individualization, Opportunity, Motivators, Instructional Events, Teacher Background, instructional settings, and costs. The results of further analyses of the data will be presented in future reports. These reports will also include analysis of additional testing to be conducted in fall, 1977, with a sample of students from the present Study analyses samples.

A consortium headed by Kirschner Associates, Inc., of Washington, D.C., was funded by NIE in March, 1976, to conduct the Instructional Dimensions Study. Other members of the consortium were Education TURNKEY Systems, Inc., of Washington, D.C.; and the Learning Research and Development Center of Pittsburgh, Pennsylvania. Steiger, Fink and Kosecoff, Inc., of Los Angeles, California, and McLean, Virginia, was involved in the initial design and development of the curriculum analysis procedures.

September, 1977

Hugh Poynor
Principal Investigator

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INTRODUCTION

Program cost analysis was included in the Study in order to allow the cost effectiveness of program characteristics to be examined along with their educational effectiveness. Critical to the conduct of the cost analysis is the identification of the specific resources utilized in any given program. By determining the amount of each resource consumed in the operation of the program and identifying the price associated with the resource, the cost of all resources consumed in the program (i.e., the total program cost) is determined. The process of analysis (identification of a resource cost) and synthesis (summation to a total program cost) makes the cost contribution of each resource to total program cost available for study as well.

Program cost analysis results relate to the educational effectiveness analysis results in at least two ways. First, the cost analysis results can be directly contrasted with reading and math program achievement, attitude, and/or attendance outcomes in order to explore possible relationships between total program cost (or relevant cost subtotals) and program outcome. Second, the educational effectiveness analysis which examines the relationship of specific program characteristics (e.g., Individualization, Opportunity, Instructional Events) to outcomes can be used as a guide for examination of specific program configurations which show greater or lesser educational promise. The program cost analysis can provide estimates of the costs associated with these specific configurations.

The cost analysis technique used in the Study focuses upon the determination of the cost of all resources devoted to a specific academic program for each of the classroom or sub-classroom analysis units included in the Study. The next section details the methodology of the program cost analysis.

METHODOLOGY

Resource Consumption Model

The phrase "cost of all resources devoted to a specific academic program" has a very specific meaning which the reader should clearly understand before trying to place program cost analysis results in the context of other "cost" studies or data with which he or she may be familiar. An academic program as viewed by an individual student or group of students may be considered as a set of resources all serving a specific purpose. For this Study, this purpose is the provision of reading or math instruction to early elementary students in schools which are Title I participating or Title I eligible.

An obvious list of such resources might include:

- Books;
- Audiovisual devices and the associated software; and
- Other types of instructional equipment.

At least as important, though somewhat less obvious, would be the following resources:

- The time of teachers spent in the classroom actually providing the instruction;
- The time of paraprofessionals/aides in this same regard; and
- The time of anyone else who actually has student contact for this instruction.

Even less obvious are the following resources which the student may or may not actually see but which are as surely devoted to this specific academic program as are the above items which involved student contact:

- The time of teachers, administrators, and others spent in planning the instructional program;

- The time of these personnel spent in training for this program plus training materials or consultants;
- The time of these personnel spent in making the decisions which are critical for the overall effective operation of the program--decisions on materials, classroom organizations, training agenda, and so on; and
- The time of administrators in the overall administrative or record keeping activities necessary for the operation of the program plus administrative materials or other administrative resources.

Each of the resources listed above has a cost associated with it; books and materials have prices; consultants have fees; and personnel are paid salaries which incur fringe benefit costs. The problem can be viewed as one of first identifying how much of a given resource (e.g., how many books, how much time) is devoted to the program and then determining the cost of this amount of resources by using the "price" associated with that resource. For instance, if a principal devotes 10 percent of his/her time to an activity specifically related to the compensatory education reading program in that school, then 10 percent of the salary and fringe benefit costs associated with that principal would be considered part of the total cost of that program. For ease of comparison between programs, the cost figure just arrived at could be divided by the appropriate number of students served in that building to obtain the cost per student of that resource.

Exhibit I shows a format that can be used for summarizing this costing process when applied to any given reading or math program. The first column lists the potential resources that could be allocated to some degree to the program. The next six columns list the activities (called "Functions" in Exhibit I) which comprise the overall program. The total amount of each resource allocated to each activity per student would be determined using a variety of cost data obtained from the district and school in question. A number of cells in Exhibit I have been crossed out; these represent resource/function intersections which have no logical basis (e.g., consuming books and audiovisual software during

EXHIBIT I

PROGRAM COST ANALYSIS STRUCTURE

Resources	Functions					
	Regular Classroom Instruction	Supplemental Instruction*	Program Planning	Program Training	Program Decision Making	Program Administration
Personnel						
Regular Teacher	1	x	13	17	22	x
Supplemental Teacher *	x	7	14	18	23	x
Paraprofessional	2	8	x	x	x	x
Principal	x	x	15	19	24	26
District Comp Ed Director	x	x	16	20	25	27
Other Staff	3	9	x	x	x	x
Consumables						
Books and AV Materials	4	10	x	x	x	x
Equipment						
AV Equipment	5	11	x	x	x	x
Other Instructional Eqpt.	6	12	x	x	x	x
Administration Eqpt.	x	x	x	x	x	28
Miscellaneous						
Training Expenses	x	x	x	21	x	x
Admin. Expenses	x	x	x	x	x	29

*Supplemental instruction is that instruction provided to a student or group of students beyond or in addition to the regular instructional program within a given school. The Study focused upon compensatory education as supplemental instruction. This being the case, the supplemental teacher in the Study is a compensatory education teacher.

administrative activities). Only the 29 resource/function cells not crossed out in this matrix would need to be filled to obtain an estimate of the overall program cost per student (as well as function and resource subtotals).

In order to calculate each of these 29 cell totals for any given program, the costing methodology described above would be followed. Exhibit II, using example data, displays in schematic fashion the specific costing methodology utilized. Moving from left to right in Exhibit II, the resources associated with specific activities are identified, priced, converted to per pupil costs, and summed over all resources to obtain an activity subtotal (this movement is identical to moving from top to bottom of a function column of Exhibit I) and then summed over all activities to obtain a total yearly program cost per pupil.

Tying Prices to Resources to Obtain Cost Estimates

As indicated above, application of the resource consumption model involves first identifying the quantity of that resource consumed in a given program (e.g., amount of teacher time, amount of administrator time) and then tying a price to that resource in order to estimate the cost of that amount of resource. An important question here is whether to adjust prices for various educational resources (e.g., teacher salary) to a common standard for the nation, a state or for some other unit larger than an individual classroom or building. A teacher with an M.A. degree and six years of experience, for instance, will receive a vastly different salary if he/she worked in a large urban center than if he/she worked in a small rural district. Differences in the cost of living, the impact of local labor supply/demand conditions, and the power of local teachers organizations are just a few of many reasons for such differences. In studies that are either statewide or nationwide in scope, one could argue for the use of standard pricing so that differences in costs accurately reflect differences in the amounts of resources consumed rather than simply differences in prices.

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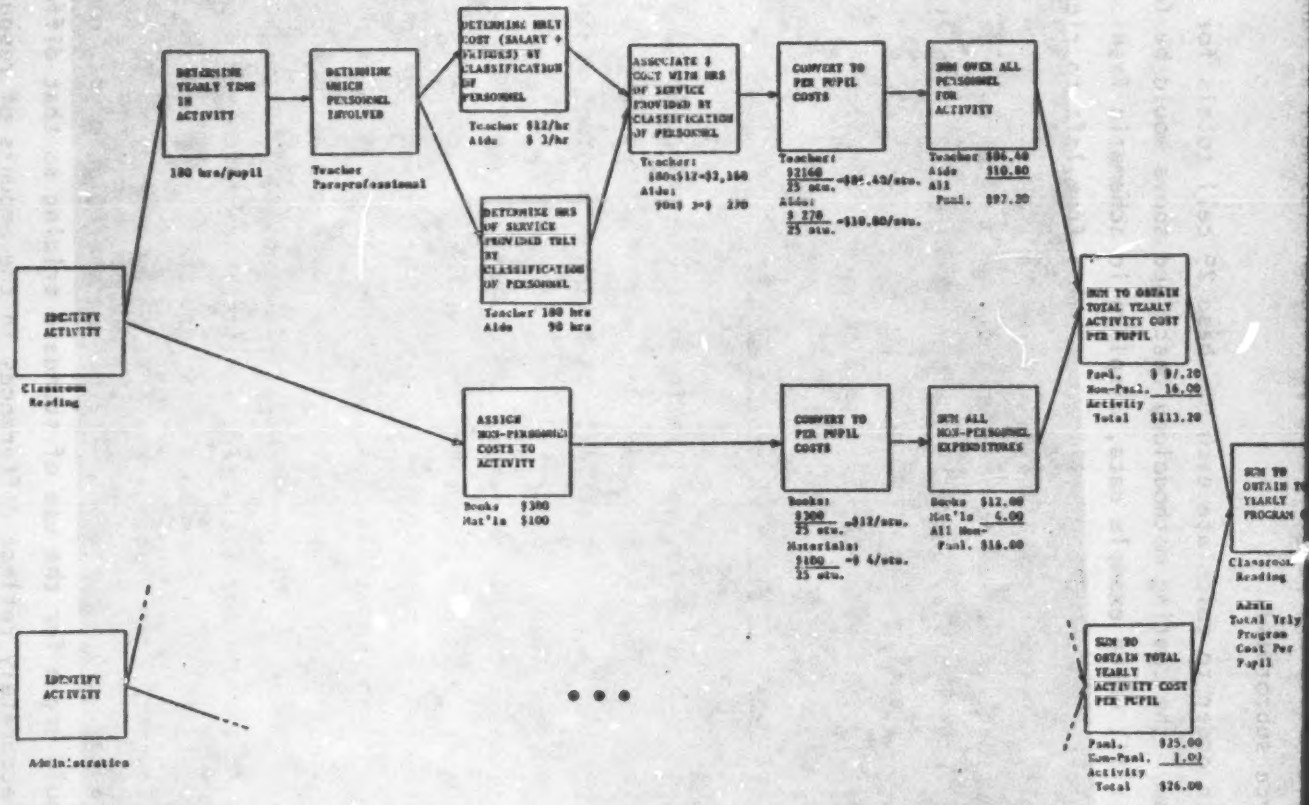
EXHIBIT II

COST METHODOLOGY SCHEMATIC


IDENTIFY ACTIVITY
Classroom Reading
DETERMINE YEARLY TIME IN ACTIVITY
180 hrs/pupil
DETERMINE WHICH PERSONNEL INVOLVED
Teacher
Paraprofessional
DETERMINE HRLY COST (SALARY + FRINGES) BY CLASSIFICATION OF PERSONNEL
Teacher $12/hr
Aide $ 3/hr
DETERMINE HRS OF SERVICE PROVIDED THIS BY CLASSIFICATION OF PERSONNEL
Teacher 180 hrs
Aide 90 hrs
ASSOCIATE $ COST WITH HRS OF SERVICE PROVIDED BY CLASSIFICATION OF PERSONNEL
Teacher: 180x$12=$2,160
Aide: 90x$ 3=$ 270
CONVERT TO PER PUPIL COSTS
Teacher: $2160 / 25 stu. =$86.40/stu.
Aide: $ 270 / 25 stu. =$10.80/stu.
SUM OVER ALL PERSONNEL FOR ACTIVITY
Teacher $86.40
Aide $10.80
All Pers. $97.20
ASSIGN NON-PERSONNEL COSTS TO ACTIVITY
Books $300
Mat'ls $100
CONVERT TO PER PUPIL COSTS
Books: $300 / 25 stu. =$12/stu.
Materials: $100 / 25 stu. =$ 4/stu.
SUM ALL NON-PERSONNEL EXPENDITURES
Books $12.00
Mat'ls 4.00
All Non-Pers. $16.00
SUM TO OBTAIN TOTAL YEARLY ACTIVITY COST PER PUPIL
Pers. $ 97.20
Non-Pers. 16.00
Activity Total $113.20
IDENTIFY ACTIVITY
Administration
SUM TO OBTAIN TOTAL YEARLY ACTIVITY COST PER PUPIL
Pers. $25.00
Non-Pers. 1.00
Activity Total $26.00
SUM TO OBTAIN TOTAL YEARLY PROGRAM
Classroom Reading
Admin
Total Yrly Program Cost Per Pupil

On the other hand, local price/salary structures undoubtedly influence the actual mix of resources found in any given program. The tradeoffs among educational resources at two different sites using ostensibly similar programs may vary depending upon the relative price of these resources. Where paraprofessionals are relatively less costly with respect to certified teachers, more paraprofessionals may be used, and where the opposite is true regarding relative prices the opposite may well be true regarding the reliance on paraprofessionals. Given this interaction of the local price structure with the actual configuration of the program as operated locally and the resource mix nature of compensatory education programs in general, an argument can be made for the use of local or actual prices in the cost analysis.

Further, where numerous comparisons are to be made among programs within a given site, local pricing would be the appropriate choice. Data limitations, such as using the school average as the reporting level for salary data (as is the case in the Study), could act to mask certain price variations present among smaller subunits within the reporting level used (e.g., between classrooms or individual teachers). The use of further price standardization may be both of limited value in removing the effects of local price variations on program cost and difficult to accomplish, given the lack of detail associated with such aggregated actual data (e.g., aggregated levels of experience or degree levels or details of actual salary structures).

Also, by focusing upon the proportion of total costs represented by a given resource or resource subtotal, local price effects may be minimized. The Study will examine both absolute dollar program costs and these corresponding proportions.

Thus, the prices used in the Study are all local prices. Future analysis could examine the impact of standard prices, but limited analysis time during the primary phase precludes this issue from further study at this time.

Program Costs Per Pupil in the Context of Overall Education Costs and School Finance

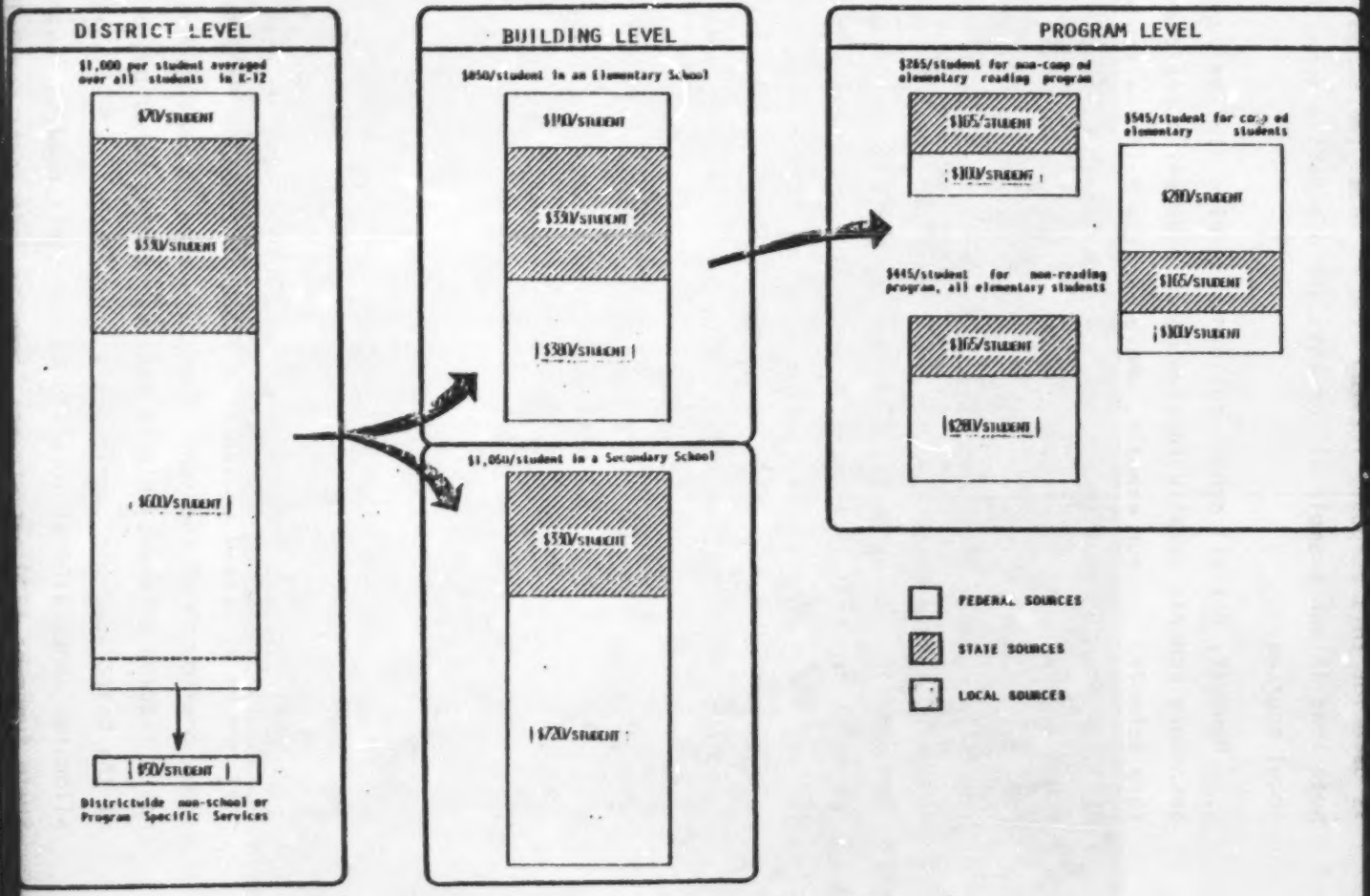
To this point, the reader has been provided with a detailed definition of the phrase "cost of all resources devoted to a specific academic program." Next, the issue of program cost will be placed in the overall context of education costs and finance. The resources which are devoted to any given academic program are provided through a pattern of funding which draws upon Federal, State, and local sources. Exhibit III presents a highly simplified view of this flow of funds to an individual program, in this case a reading program for students in an elementary school having a concentration of compensatory education students. It should be noted that the dollar figures shown in Exhibit III are illustrative in nature; these figures are not intended as being representative of actual dollar amounts from such funding sources nationwide, nor are they intended as guidelines for proper practice. This exhibit is included here to allow the reader to be able to relate the program cost figures in the Study to discussions of educational cost or finance issues to be found elsewhere in the research literature.

In Exhibit III, a total of $1,000 of funds is available per student at the district level for a given year. These funds are obtained from a variety of sources: local revenues produce $600 of the total in this illustration; State sources, $330; and Federal sources, the remaining $70. This total pool of funds is used to purchase various resources which will in turn provide the intended educational programs. The district outlines its plan for purchasing these resources in various budget documents and keeps track of actual expenditures for these resources by means of its accounting system throughout the school year.

While a pool of $1,000 per student is available at the district level initially (this figure represents an average over all K-12 students), not all students will receive the same amount of resources devoted to their programs. First of all, not all of this $1,000 pool reaches the school buildings of the district; a small portion is used to purchase districtwide (non-school or program specific) services such as the ser-

EXHIBIT III

HYPOTHETICAL RESOURCE FLOW FROM FEDERAL, STATE, AND LOCAL SOURCES TO AN INSTRUCTIONAL PROGRAM



vices of the superintendent. In our example, $50 of this $1,000 total is used for this purpose, leaving $950 to reach the school buildings. Note that in our example all of this administrative money has come from local sources.

However, not all school buildings receive similar funding levels. Secondary schools usually receive more funds per pupil than do elementary schools. In our example, where exactly half the students in the district attend elementary schools and the other half attend secondary schools, the secondary schools receive $1,050 per student compared to $850 per student at the elementary level (averaging $950 per student overall). Beyond this difference, the actual amounts allocated to these schools may vary quite severely by fund source. In our example, the entire pool of Federal funds ($70/student at the district level) must be spent for programs in elementary schools. Thus, of the $850 reaching the average elementary student, $140 comes from Federal sources whereas none of the $1,050 reaching our average secondary student (or the $50 spent for all K-12 administration) comes from that fund source. The State source funds in our example, however, are evenly allocated between elementary and secondary programs; and since none of the districtwide administrative activities drew upon these funds, the full amount of $330 per pupil is passed along to be spent in all district schools at the same funding level. The remainder of our per pupil funds at each type of school comes from local sources. However, due to the existence of Federal funds in the elementary buildings, only $380 of local funds are provided for our average elementary student, compared to $720 of these funds for our average secondary student.

Within the elementary school setting, the $850 of per pupil funding must now be allocated to specific academic programs. In our example, about one-fourth of the local funds are used to provide the school's basic reading program; this is because reading makes up about one-fourth of the basic academic curriculum in this school. Thus, all students are allocated about $100 of local funds for their reading instruction. The State funds of $330 per student, however, are spent one-half on reading

and the other half on all other programs. Thus all students are also allocated $165 of State funds for their reading instruction.

The Federal dollars of $140 per student in our elementary school are actually compensatory education monies in our example, i.e., they must be spent on compensatory education students. This district has told the State department of education that it would concentrate its entire compensatory education on the development of reading skills. Since our hypothetical elementary school has an enrollment made up of one-half compensatory education students and one-half non-compensatory education students, our compensatory education students are also allocated $280 of Federal funds for their reading program whereas the non-compensatory education students receive no Federal funds for this purpose.

The end result of all these fund flows is that a compensatory education student in our example elementary school is allocated $545 of funds from all sources for his or her reading program ($100 of local funds plus $165 of State funds plus $280 of Federal funds); while the non-compensatory education student is allocated $265 ($100 of local funds plus $165 of State funds). The resources bought with these funds are the same resources that would be reflected in the cost model for that program as developed using Exhibits I and II.

Units of Analysis

Program cost analysis in the Study was conducted for two different units of analysis. The first of these units is the classroom. Analysis at the classroom level is designed to portray the average cost per student per year of each cost subtotal included in the model for all students included in the classroom. This means that the cost for supplemental instruction, for instance, is the average of the actual cost per student for those students receiving supplemental instruction and a zero cost per student for those students not receiving this instruction. For example, if supplemental instruction costs $100 per student annually for those students actually receiving it and only one-third of the class

receives this instruction, then the cost per student annually for supplemental instruction at the classroom unit of analysis level sould be $33 (= 0.33 x $100 + 0.67 x $0).

At the classroom unit of analysis level, the amount of time spent receiving (and therefore the cost of) regular instruction is also averaged over the entire classroom of students. For example, if regular instruction amounts to 360 hours per year per student receiving only regular instruction (i.e., not receiving any supplemental instruction) and to 324 hours per year for students who receive both regular and supplemental instruction (due to some overlap between these instructional periods) and only one-third of the classroom receives supplemental instruction, then the average hours of regular instruction received by a student in that classroom would be 348 hours (= 0.33 x 324 + 0.67 x 360).

By way of contrast, the second of the units of analysis addressed by the program cost analysis in the Study is the instructional unit. This unit is a sub-classroom unit and includes, as separate units within that classroom, each cluster of students having similar program experience, i.e., students with the same regular instructor and with the same supplemental or compensatory education instructor as well. Thus, the above described example might include two instructional units with the following characteristics:

- First instructional unit (only regular instruction received)
  cost per student year of supplemental instruction = $0
  average hours of regular instruction received by a student = 360
- Second instructional unit (both regular and supplemental instruction received)
  cost per student year of supplemental instruction = $100
  average hours of regular instruction received by a student = 324

The situation described above could be complicated by the presence of more than one supplemental instructor, but the conceptual differences between the classroom unit and the instructional unit would remain as described.

The above discussion addressed the analysis differences between the classroom and instructional units as they relate to direct teacher-student contact. Similar differences exist regarding the non-contact activities modeled as well (i.e., planning, training, decision-making, administration). At the classroom level, these non-contact costs must reflect the average of such costs over all students in the classrooms, i.e., the regular portion from which all students benefit plus the average supplemental (or compensatory education portion) treated in a weighted average fashion as was illustrated for the direct instructional functions above. For these non-contact functions more personnel than only teachers are involved, but the cost contribution from these staff are treated exactly like those of teachers in this regard.

DATA COLLECTION

Local Budgets

The data used for building these cost models were obtained from a variety of sources.[1] Local budgets, both general fund and compensatory education, were obtained from each site. Resource totals used in many of the 29 cells of Exhibit I were obtained directly from these budgets combined with district and school compensatory education and total enrollment figures. Exhibit IV describes the budget analysis procedures followed for these data from each site.

Salary Data

Another major data source for the cost models was a salary listing obtained from each site for personnel involved in the Study at each of the schools studied at the site as well as any central personnel inter-

[1] See the Supporting Report, *Data Collection Management*, for a discussion of these instruments.

EXHIBIT IV

INFORMATION NEEDED FROM BUDGET DOCUMENTS

Source Documents: School Year 1976-77 General Fund Budget
School Year 1976-77 Compensatory Education Budgets (all that are relevant to study classrooms, including at least the ESEA Title I Budget for School Year 1976-77)

A. From the General Fund Budget

1. Fringe benefit information

a. Total cost of fringe benefits (usually in "Fixed Charges" portion of traditional school budgets) including Social Security, workmen's compensation, health and life insurance, plus any other fringe benefit type of cost. If a particular benefit does not apply to all Local Education Agency (LEA) employees, the specific target group should be identified (e.g., teachers' retirement costs).

b. Total salaries (excluding salaries of substitute teachers) of all LEA staff receiving benefits included in a. (above). Whenever a specific benefit has been targeted to a particular group, the total salaries of that target group should also be identified.

c. Total salaries for substitute teachers.

d. Total salaries for all teachers served by the substitutes involved in c. (above).

2. Books and audiovisual (AV) software

a. All costs for textbooks, workbooks, teaching supplies, testing supplies, library books, AV software (audiotapes, filmstrips, etc.), plus any other instructional consumable item that applies to elementary reading and/or math (specifically grades 1 and 3).

b. These costs are usually found in the "Instruction" account of traditional school budgets.

c. The grade levels and subject matters served by each portion of the total included in a. (above) should be identified.

EXHIBIT IV (continued)

d. School-specific totals (for the schools in Study sample) should be shown only if they are shown at that level of detail in the overall budget. Where available, these totals should be identified as to the school, grade(s), and subject(s), (reading, math, etc.), that are served.

3. Audiovisual equipment

a. All costs for AV equipment replacements, new purchases, etc.

b. These totals are usually found in the "Maintenance of Plant and Equipment" and/or "Capital Outlay" accounts of traditional school budgets.

c. The school (if available), grade(s), and subject(s) served should be identified.

4. Other instructional equipment

a. All costs for instructional equipment (not specified as being AV) replacement, new purchases, etc.

b. These totals are usually found in the same accounts as 3. (above).

c. The school (if available), grade(s), and subject(s) served should be identified.

B. From the Compensatory Education Budget(s)

1. Fringe benefit information

a. See A.1. (above).

b. The specific compensatory education budget from which any data has been taken should be identified as well.

2. Books and audiovisual (AV) software

a. See A.2. (above).

b. The specific compensatory education budget from which any data has been taken should be identified as well.

3. Audiovisual equipment

a. See A.3. (above).

b. The specific compensatory education budget from which any data has been taken should be identified as well.

EXH'BIT iV (continued)

4. Other instructional equipment
   a. See A.4. (above).
   b. The specific compensatory education budget from which any data has been taken should bo identified as well.
5. Miscellaneous training costs
   a. All costs of in-service training or workshops funded under compensatory education, including expenses paid to trainees, fees paid to training consultants, training materials, etc.
   b. The specific compensatory education budget providing data, plus the school(s), grade(s), and subject(s) served should also be identified.
6. Miscellaneous administrative equipment
   a. All costs of non-instructional equipment funded under compensatory education.
   b. The specific compensatory education budget providing the data, plus the school(s), grade(s), and subject(s) served should be identified.
7. Miscellaneous administrative costs
   a. All non-personnel administrative expenses funded under compensatory education, including office supplies, office rentals, etc.
   b. The specific compensatory education budget providing the data, plus the school(s), grade(s), and subject(s) should also be identified.

viewed. These data included not only the total 1976-77 salary from all sources but also the specific contribution to that total from local sources, Federal funds, or State funds sources (see Exhibit V, an excerpt from the District Program Report instrument used in the Study). These data, coupled with the fringe rate data described in Exhibit IV, were used to establish a "price" for each staff time resource identified in the Study as being allocated to the instructional programs of interrest at that school or site.

It should be noted that, while data were obtained on funding sources for each salary figure, only the total salary figure was used in the analyses conducted. These fund source-detailed data are available for future analyses, however.

A number of assumptions regarding salary were made due to limitations of the data actually collected. These assumptions included:

- The average salary for paraprofessionals used in regular instruction in a given Study school was assumed to be equal to that for compensatory education paraprofessionals or aides in that same school.
- The average salary for other instructional personnel (encompassing mostly district-paid subject specialists) used in regular instruction in a given Study school was assumed to be equal to that for regular teachers in that same school.
- The average salary for other instructional personnel used in supplemental instruction in a given Study school was assumed to be equal to that for supplemental or compensatory education teachers in that same school.

It should also be noted that the salary data obtained were average salaries for a given staff category (e.g., regular teachers, supplemental teachers, aides) in a Study school. Data could have been obtained in a classroom or personnel-specific manner, but in the interests of minimizing the Local Education Agency/Study site coordinator reporting burden the aggregated data requested via Exhibit V sought instead. This fact was referenced earlier in the discussion of the decision to use local

EXHIBIT V

EXCERPT FROM THE DISTRICT PROGRAM REPORT

Enter total salary amounts and amounts from various sources for selected personnel in each school building in the study. These totals will have to be computed from available lists. Includes only the district administrator that was interviewed; the principals that were interviewed as well as regular and supplementary teachers that were interviewed. Note there is a separate category for Comp Ed Paraprofessionals (Aides) and they were not usually interviewed. Use as many forms as needed to enter total salaries and FTE's (not people) for each study building.

STAFF CATEGORY	CATEGORY FTE	TOTAL SALARY	LOCAL FUNDS	FEDERAL FUNDS	STATE FUNDS
Compensatory Ed. Administrator					
Field Size:	(3.1)	(5.0)	(5.0)	(5.0)	(5.0)

No. schools to follow below_____

School Code					
Principal					
Reg. Teachers					
Supplem. Tchrs.					
Comp. Ed. Aides					
FS	(3.1)	(6.0)	(6.0)	(6.0)	(6.0)

rather than standard salaries in the cost analyses due to the already aggregated nature of the local salary data.

Staff Time Allocations

Staff time allocation estimates were obtained in a number of ways. For classroom instructional activities (regular or supplemental), estimates were obtained from all teaching personnel in the Study as to the amount of time students received regular instruction, the amount of time students received supplemental instruction, and the amount of overlap between these two times for each student. These individual estimates were used (in a manner reflected earlier in the discussion of the units of analysis) for each program to determine the total hours of reading instruction received each year by a student in that program. Data on staff ratios during regular and supplemental or compensatory education instruction were also obtained from all teaching personnel. Together with the "price" data alluded to above, these time and staff ratio data produced these in-the-classroom resource costs.

Estimates of the amount of paraprofessional or other (paid) staff time used in regular and supplemental instruction were also obtained from all teaching personnel. Together with the staff ratio and student time allocation data above and the salary assumptions regarding paraprofessionals and other (paid) staff listed earlier, these staff time estimates produced the in-the-classroom resource costs associated with these staff.

For the time allocations not involving student time, each person interviewed provided estimates of the percent of their available time (i.e., working time not in contact with students) they devoted to the following activities:

- Planning for reading, math, and other programs;
- Training for such programs;
- Decision-making related to such programs; and

- Administrative duties related to such programs.

Exhibits VI, VII, and VIII show the actual survey item used for teachers, principals, and district administrators, respectively.

Coupled with data on the actual amount of available working hours each year for that person, the total time devoted by that person to each of these activities was determined. Using this as a basis, the program total for this allocation was determined. The cost of this total was then "priced," using the salary/fringe data described above, and finally allocated to the number of students served by that program in order to obtain further entries for Exhibit I.

Analysis Design/Data Limitations

A number of analysis design limitations should be noted here. First, it was assumed that principals and district administrators have little or no direct classroom instructional contact with students on a regular basis in our Study sites and schools. Thus, no costs for these personnel are included in the in-classroom functions of each cost model (regular instruction and supplemental instruction).

It should also be noted that aides and other (paid) staff, as referenced above, were not interviewed in the Study. Thus, the staff time allocation data reflected in Exhibits VI, VII, and VIII were not obtained for these personnel. Consequently no costs are shown for these personnel in the non-classroom functions of each cost model (planning, training, decision-making, administration). This omission would cause all cost models to be underestimates of actual costs had these personnel provided these data, but the degree of this underestimate is assumed to be slight. In a similar application of these costing techniques such an omission would have amounted to an average of no more than one percent of total program costs.

EXHIBIT VI

EXCERPT FROM TEACHER (REGULAR AND SUPPLEMENTAL) INTERVIEWS

[USE TEACHER CARD T] Under your current contract, you have a certain number of working hours when you are not in scheduled contact with students. [PROVIDE AN ESTIMATE OF THE NUMBER OF SUCH HOURS FOR TEACHERS IN THIS SCHOOL DISTRICT.] This non-contact time would include time prior to the start of classes in fall, time after the close of classes in spring, time before students arrive each school day, time after students leave school each day, days or hours of in-service training, and other days when you are required to work and the students are not in school. Please estimate for the full school year how you use these working hours during which you are not in scheduled contact with students. [ENTER PERCENT FOR EACH]

ACTIVITIES CATEGORY	PERCENT OF TIME
a. Planning for math instruction	
b. Planning for reading instruction	
c. Receiving training for math instruction	
d. Receiving training for reading instruction	
e. Participating in decisions related to math instruction (such as selecting materials or tests, determining performance objectives, determining evaluation designs, etc.)	
f. Participating in decisions related to reading instruction (such as selecting materials or tests, determining performance objectives, determining evaluation designs, etc.)	
g. Performing other activities related to math instruction (such as grading papers, meeting with parents, etc.)	
h. Performing other activities related to reading instruction (such as grading papers, meeting with parents, etc.)	
i. All other non-contact activities [SPECIFY]_____	
j. Total Time	100%

EXHIBIT VII

EXCERPT FROM THE PRINCIPAL FACT SHEET

The following question asks that you assess the percent of time that you have or will work on the following activities during the school year.

What is the percent of total working time that you spend on each of the following activities? (TOTAL PERCENT OF TIME WILL EQUAL 100%)

PERCENT

Planning for. . .

Comp ed reading activities _____ ☐☐

Comp ed math activities _____ ☐☐

All other instructional activities _____ ☐☐

Receiving or conducting training for. . :

Comp ed reading activities _____ ☐☐

Comp ed math activities _____ ☐☐

All other instructional activities _____ ☐☐

Participating in decisions (that is, selecting materials or tests, determining performance objectives, determining evaluation designs) related to. . .

Comp ed reading activities _____ ☐☐

Comp ed math activities _____ ☐☐

All other instructional activities _____ ☐☐

General administrative activities for. . .

Comp ed reading _____ ☐☐

Comp ed math _____ ☐☐

All other areas _____ ☐☐

All other activities (LIST) _____

_____ ☐☐

100%

EXHIBIT VIII

EXCERPT FROM THE DISTRICT FACT SHEET

The following question asks that you assess the percent of time that you have or will work on the following activities during the school year.

What is the percent of total working time that you spend on each of the following activities? (TOTAL PERCENT OF TIME WILL EQUAL 100%.)

PERCENT

Planning for. . .

Comp ed reading activities _____ ☐☐

Comp ed math activities _____ ☐☐

All other instructional activities _____ ☐☐

Receiving or conducting training for. . .

Comp ed reading activities _____ ☐☐

Comp ed math activities _____ ☐☐

All other instructional activities _____ ☐☐

Participating in decisions (that is, selecting materials or tests, determining performance objectives, determining evaluation designs) related to. . .

Comp ed reading activities _____ ☐☐

Comp ed math activities _____ ☐☐

All other instructional activities _____ ☐☐

General Administrative activities for. . .

Comp ed reading _____ ☐☐

Comp ed math _____ ☐☐

All other areas _____ ☐☐

All other activities (LIST) _____

_____ ☐☐

100%

Treatment of Missing Data

The program cost analysis is based upon a deterministic cost model; i.e., there exists a total program cost to which every resource which incurs costs contributes. In order to ascribe a total program cost to any given analysis unit, all data values needed for the cost analysis must be present. To do otherwise would be akin to estimating total family living expenses but leaving out mortgage payments for those cases where mortgage loan payment data were unavailable. Thus, where a given item of data needed for the cost analysis was missing, an average value for this item was substituted to allow complete calculation to proceed. The average value chosen for use in place of a missing value was determined in the following priority manner; i.e., the first of these options that provided data would be chosen:

1. first choice was the average of this item from other respondents in the same school, grade, and role;
2. next was from other respondents in the same school and role;
3. next was from other respondents in other Study schools at that site in the same role and grade;
4. next was from other respondents in other Study schools at that site in the same role;
5. next was from other respondents in a similar role where such a role exists (e.g., regular teacher or compensatory education teacher) in the same school and grade;
6. next was from other respondents in a similar role in the same school;
7. next was from other respondents in a similar role in other Study schools at that site in the same grade;
8. next was from other respondents in a similar role in other Study schools at that site;
9. next was from other respondents in other Study sites in the role and grade;
10. next was from other respondents in other Study sites in the same role;

10. next was from other respondents in other Study sites in the same role;

11. next was for other respondents in a similar role where such a role exists in other Study sites in the same grade;

12. last was for other respondents in a similar role in other Study sites.

Exhibit IX summarizes these 12 priority methods for filling missing values.

Missing salary data were first sought within the same site, then within other Study sites within that same State, then from the full Study data base, if necessary.

EXHIBIT IX

SUMMARY OF PRIORITY CHOICES FOR FILLING
MISSING COST ANALYSIS DATA VALUES

(Numbers Shown are Ordinal Preferences)

		Location		
Role	Grade Level	Same School	Same Site Other Schools	Other Sites
Same Role	Same Grade	1	3	9
	Any Grade	2	4	10
Similar Role (if possible)	Same Grade	5	7	11
	Any Grade	6	8	12